coupled to the array; interrogating an object with electromagnetic radiation from the array; generating data representative of the object from this interrogation with the one or more processors; and transmitting the data over a computer network to a remote site. The electromagnetic radiation has a frequency in a range of about 200 MHz to about 1 THz.

Further embodiments include a system, method, device, and/or apparatus to determine dimensional and/or imaging information about an object with electromagnetic radiation. In one preferred form, the electromagnetic radiation is selected from a frequency range of about 200 Megahertz (MHz) to about 1 Terahertz (THz). In a more preferred form, the electromagnetic radiation is in a frequency range of about 1 GHz to about 300 GHz. In a most preferred form, the electromagnetic radiation is in a range of about 5 GHz to about 110 GHz.

Accordingly, one object of the present invention is to provide a unique technique to obtain information through interrogation with electromagnetic radiation.

Another object is to provide a unique system, method, device, or apparatus to determine dimensional, topographical, image, and/or volumetric information about an object.

Other objects, embodiments, forms, features, advantages, aspects and benefits of the present invention shall become apparent from the detailed description and drawings included herein.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a partial, diagrammatic view of an interrogation system.

FIG. **2** is a partial, top view of the FIG. **1** system along the view line **2**—**2** shown in FIG. **1**.

FIGS. **3** and **4** are flow charts illustrating one procedure for operating the system of FIG. **1**.

FIG. **5** is a schematic, top view of the system of FIG. **1** illustrating a number of overlapping arc segments.

FIG. **6** is a computer-generated image provided in accordance with the procedure of FIGS. **3** and **4**.

FIG. **7** is a partial, diagrammatic view of another interrogation system.

FIG. **8** is a partial, diagrammatic view of yet another interrogation system.

FIG. **9** is a partial, top view of the system of FIG. **8**.

## DETAILED DESCRIPTION

While the present invention may be embodied in many different forms, for the purpose of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. Any alterations and further modifications in the described embodiments, and any further applications of the principles of the invention as described herein are contemplated as would normally occur to one skilled in the art to which the invention relates.

One nonlimiting form of the present invention includes an interrogation technique to obtain topographic data about a surface of an object that can be hidden by one or more layers, such as clothing, or exposed. The interrogation is performed with a scanner that emits electromagnetic radiation in frequency range including the millimeter and/or microwave wavelength bands. The data can be used to form a three-dimensional topographical representation of the surface, determine object dimensions, and/or render one or more images of the object. When applied to a clothed individual, the scanner is capable of discriminating between layers of clothing and identifying skin impressions (indentations) left by tight fitting clothing (e.g., socks, belts, undergarment bands and straps). This data can be of interest for apparel designers. Likewise, the scanner can be used to measure one or more features of an individual's body to fit clothing or select body-fitted equipment. Additionally or alternatively, the scanner can interrogate inanimate and animate objects residing on a person's body (even if covered by clothing), in clothing itself, and in baggage. These features can be desirable for certain security applications.

FIG. **1** illustrates system **20** of one embodiment of the present invention. In operation, system **20** determines dimensional and/or topographical information about an animate or inanimate object by illuminating it with electromagnetic radiation in the 200 Megahertz (MHz) to 1 THz frequency range and detecting the reflected radiation. The corresponding wavelength range includes the millimeter and microwave bands. Certain natural and synthetic fibers are often semi-transparent to such frequencies/wavelengths, permitting the detection and/or imaging of surfaces positioned beneath such materials. When the subject of interrogation is a clothed individual, dimensional information about portions of a person's body covered by clothing or garments can typically be obtained with system **20**, as well as those portions that are not covered by clothing or garments.

As illustrated in FIG. **1**, body B is in the form of a person **22** presented for interrogation by system **20**. Person **22** is portrayed in a typical manner, being at least partially covered by garments or clothing designated by reference numerals **24***a* and **24***b*. Person **22** is positioned in scanning/illumination booth **30** of system **20**. Booth **30** includes platform **32** connected to motor **34**. Platform **32** is arranged to support person **22** or such other object desired to be examined with system **20**. Motor **34** is arranged to selectively rotate about rotational axis R while person **22** is positioned thereon. For the orientation shown, axis R is approximately vertical, and person **22** is in a generally central position relative to axis R and platform **32**.

Booth **30** further includes a multiple element-sensing array **36**. Referring additionally to the partial top view of FIG. **2**, the relationship of platform **32** to array **36** is further illustrated. Axis R is generally perpendicular to the view plane of FIG. **2** and is represented by crosshairs. As motor **34** causes platform **32** to rotate about axis R, array **36** circumscribes a generally circular pathway P about axis R. Circular pathway P corresponds to an imaginary cylinder C with radius D. Radius D is the distance from axis R to array **36**. In one preferred form, radius D is about 0.5 to about 2 meters. In a more preferred form, radius D is about 0.5 meters to 1.5 meters—corresponding to about a 1 meter to 3 meter diameter. Arrow A shown in FIGS. **1** and **2** represents the selective rotation of platform **32** about axis R.

Sensing array **36** includes a number of linearly arranged elements **38** only a few of which are schematically illustrated and specifically designed by reference numerals to preserve clarity. Elements **38** each operate to transmit or receive electromagnetic radiation within a selected bandwidth. Sensing array **36** is coupled to control and processing subsystem **40**. Subsystem **40** includes transceiver **42** with switching tree **43** coupled to elements **38** of array **36**. In one form, the position of array **36** relative to platform **32** is